ANKLE PULSE VOLUME AND PRESSURE IN THE ASSESSMENT OF PERIPHERAL VASCULAR OBSTRUCTIVE DISEASE

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The determination of systolic ankle pressure in patients suffering from peripheral arterial occlusive disease is widely used in evaluating the circulatory status of the leg.[1-5] Segmental air plethysmography is another reliable method for the assessment of blood flow to a limb.[6-7] The following report correlates information obtained by the use of both methods.

MATERIALS AND METHODS

We examined 92 consecutive patients, including 63 men and 29 women, who complained of intermittent claudication. Patients ranged in age from 38 to 73 years, with the majority in their sixth and seventh decades.

Examination was performed after 20 min of bed rest at an ambient temperature of 24-26° C. Patients refrained from smoking for at least 2 hours before testing.

Systolic ankle and systemic pressures were determined by means of a Doppler ultrasound stethoscope, as described elsewhere.[1,8] The ratio of ankle/arm (A/A) systolic pressures indicated the degree of vascular disturbance.[1,5]

Ankle pulse volumes were determined by segmental air plethysmography[6] using the Model P-103 Vasoanalyzer.*** The ankle pulse of highest amplitude was compared with the highest pulse obtained at the wrist; the ankle-wrist pulsation ratio (AWPR) served as a measure of flow disturbance to the lower leg.[7]

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RESULTS

When the A/A pressure ratio was compared with the AWPR for 184 limbs, an r-value (Pearson-Lee correlation coefficient) of 0.695 was obtained. The r^2-value (coefficient of determination), which expresses variations in AWPR due to variations in A/A, was 0.483; i.e., 48.3% of the variations in AWPR could be accounted for by the variation of A/A. Data were grouped according to the two related diseases most often present in these patients—diabetes mellitus and hypertension.

Diabetic Patients

After diabetic patients whose arteries were incompressible by inflatable cuffs had been excluded, 19 patients with diabetes mellitus remained in this group. The correlation coefficient (r-value) between A/A and AWPR for 38 legs was 0.740, and the r^2-value was 0.55. Therefore, in this group, the correlation between both tests as to the severity of vascular disturbance was better than for the series as a whole.

Hypertensive Patients

Thirty-three hypertensive patients were included in this group. Hypertension was defined as a systolic arm pressure of 150 mm Hg or above. The r-value obtained for the 66 legs was 0.601, and the r^2-value was 0.361. Therefore, A/A ratios and AWPR correlated least in these patients.

Non-Hypertensive Patients

Forty patients were included in this group. The r-value for A/A and AWPR values for the 80 legs was 0.774, and the r^2-value was 0.600. The correlation between both indices was better here than in either of the previous two groups or the series as a whole.

Using the appropriate statistical method,[9] r-values of the non-hypertensive (0.774) and the hypertensive patients (0.601) were compared, and a z-value of 1.975 was obtained; the P value for this test was < 0.05, i.e., the correlation between the two indices (A/A and AWPR) was significantly lower in the hypertensive than in the non-hypertensive patients.

COMMENT

The results point out the discrepancies in two well-accepted methods of evaluating circulatory disturbances to the legs. In our heterogeneous series of patients, the degree of severity of the disease indicated by the ankle/arm pressure ratio did not always agree with that implied by ankle air plethysmography. When patients were grouped according to the presence of diabetes or hyper-

tension, it was found that a reasonably good correlation existed between both methods of examination in normotensive patients; slightly less correlation was found in diabetic patients, and that of hypertensive patients was poor.

Our experience points to the fact that the most satisfactory evaluation of peripheral arterial obstructive disease is obtained when both methods are applied and the lower value is taken as indicating the severity of the disease.

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